

# Review: Linear Equations and Inequalities

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## Objectives

- Review the following:
- Solving equations in one variable
- Solving inequalities in one variable
- Graphing linear equations
- Graphing linear inequalities

## Rules for solving linear equations in one variable

- Remove any parentheses
- Use addition or subtract to isolate x on one side of the equation and all other numbers on the other side of the equation.
- Use multiplication or division to find the value of x.

$$2x+10=3(x+12)$$

$$\begin{array}{r}
 \frac{1}{3}x + 10 = \frac{2}{3}x - 5 \\
 \quad -\frac{1}{3}x \quad -\frac{1}{3}x \\
 10 = \frac{1}{3}x - 5 \\
 \quad +5 \quad \quad +5 \\
 3 \cdot 15 = \cancel{\frac{1}{3}}x \cdot \cancel{3} \\
 45 = x
 \end{array}$$

## Rules for solving linear inequalities in one variable

- Remove any parentheses
- Use addition or subtract to isolate x on one side of the equation and all other numbers on the other side of the equation.
- Use multiplication or division to find the value of x. If you multiply or divide by a negative, reverse the inequality symbol.

$$5x+12<3x-8$$

$$\begin{array}{r} -3x \quad -3x \end{array}$$

$$2x+12<-8$$

$$\begin{array}{r} -12 \quad -12 \end{array}$$

$$\frac{2x}{2} < \frac{-20}{2}$$

$$x < -10$$

$$-5x-3>-23$$

$$\begin{array}{r} +3 \quad +3 \end{array}$$

$$\begin{array}{r} -5x > -20 \\ \hline -5 \quad -5 \end{array}$$

$$x < 4$$

$$10 \leq 2x+4 \leq 30$$

$$\begin{array}{r} -4 \quad -4 \quad -4 \end{array}$$

$$\frac{6}{2} \leq \frac{2x}{2} \leq \frac{26}{2}$$

$$3 \leq x \leq 13$$

$$\begin{array}{r} -5x-3 > -23 \\ +5x \quad +5x \end{array}$$

$$\begin{array}{r} -3 > -23 \\ +23 \quad +23 \end{array}$$

$$20 > 5x$$

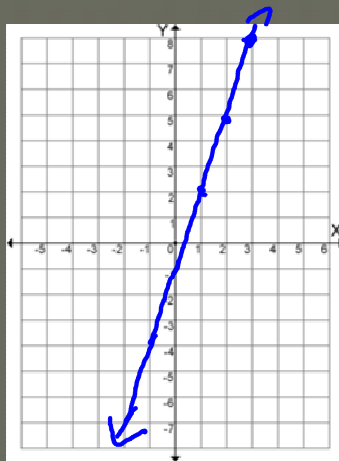
$$4 > x$$

# Graphing linear equations

- Isolate y, if necessary.
- Pick values for x and solve for y. Pick at least three values.
- Graph the ordered pairs.
- Use a ruler to make a straight line.

$$\begin{array}{l} y = x + 2 \\ x + y = 5 \\ -x \quad -x \\ \hline y = 5 - x \end{array}$$

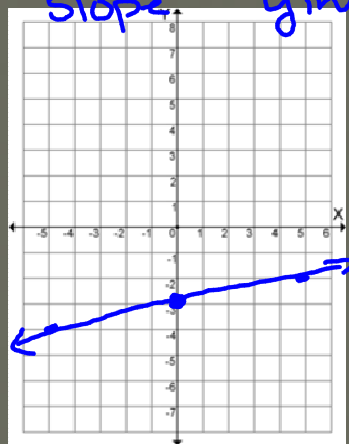
$$y = 3x - 1$$



$$\begin{array}{r|l} x & y \\ 1 & 2 \\ 2 & 5 \\ 3 & 8 \end{array}$$

$$y = mx + b$$

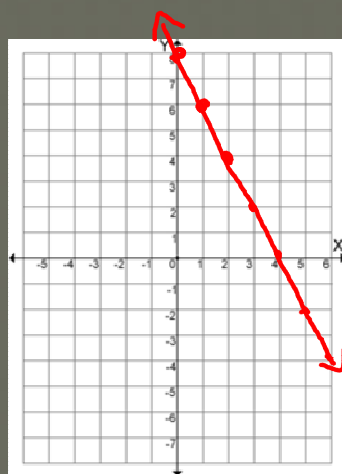
slope      y int



$$y = \frac{1}{5}x - 3$$

$$\text{slope} = \frac{1 \text{ rise}}{5 \text{ run}}$$

$$y \text{ int} = -3$$



$$2x + y = 8$$

$$-2x \quad -2x$$

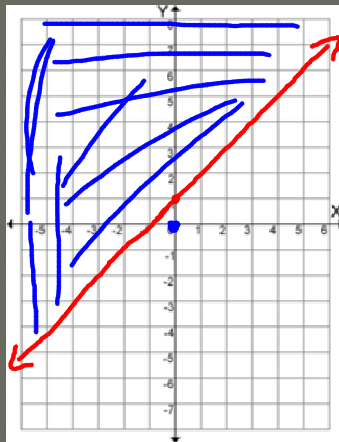
$$y = -2x + 8$$

x	y
0	8
1	6
2	4

# Graphing linear inequalities

- Isolate  $y$ , if necessary.
- Pick values for  $x$  and solve for  $y$  as if the inequality sign was an equal sign. Pick at least three values.
- Graph the ordered pairs.
- Use a ruler to make a straight line.
- Pick a test point that is not on the line.
- Plug the test point into the original inequality. If it is true, shade the half plane that it is in. If it is false, shade the other half plane.

$$y > x + 1$$



$$\begin{aligned} 0 &> 0 + 1 \\ 0 &> 1 \\ \text{F!} \end{aligned}$$

$$y \leq -3x + 8$$



$$0 \leq -3(0) + 8$$

$$0 \leq 8$$

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